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# Desert

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# Desert

## Abstract

**DESERT** (Pers. *bīābān*; *kavīr*; *lūt*; see below), area of low precipitation that supports little vegetation and lacks surface water. Secondary characteristics typically include poor soils, salinity, high winds, and extreme temperatures, accompanied by high rates of erosion and sand accumulation. Global wind patterns maintain these conditions in zones that encircle the earth in the subtropical latitudes, both north and south of the equator.

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# DESERT

**DESERT** (Pers. *bābān*; *kavīr*; *lūt*; see below), area of low precipitation that supports little vegetation and lacks surface water. Secondary characteristics typically include poor soils, salinity, high winds, and extreme temperatures, accompanied by high rates of erosion and sand accumulation. Global wind patterns maintain these conditions in zones that encircle the earth in the subtropical latitudes, both north and south of the equator.

In the northern hemisphere the arid zone extends from the Atlantic through North Africa and southwestern Asia into northern India. East of Persia the high mountain barrier separating Central Asia from the subcontinent produces an extension of the arid zone through more temperate latitudes from the [Caspian](#) as far as Mongolia and China. This aridity dates from the Quaternary or, in some parts, the Tertiary (Fisher, p. 92; Kohl, p. 25). Despite great variation in altitude, from below sea level at the Caspian shore and in the Turfan depression to more than 2,000 m above sea level on parts of the Iranian plateau, the zone evinces a remarkable degree of continuity, in soils and landforms, plant communities, and fauna, as well as in human technological adaptation and cultural response. This continuity has been reinforced over thousands of years by coadaptation between natural processes and various technologies that have been developed to accommodate the problems of aridity.

Paradoxically this Asian arid zone appears to have served as a conduit for population movements and cultural influences since the earliest evidence of human occupation. Where it passes through southwestern and central Asia it comprises the theater of Iranian history. The Iranian plateau lies athwart the zone, forming a bridge between its subtropical extension into the subcontinent and its temperate extension through Central Asia. Consequently, although deserts make up no more than 20 percent of the total land surface of the world, they have been a dominant feature in Iranian geography.

In this article the information currently available on Iranian desert regions is summarized from the general perspective of their historical significance.

## Desert Types.

The general Persian word for desert is *bābān*. As throughout most of the arid zone agriculture and settlement depend upon sustained investment, Persians generally expect to find *bābān* where *ābādī* (settled, irrigated [agriculture](#)) ends. The term *bābān* covers a broad range of different types of desert, from completely barren expanses at one extreme to plains with significant percentages of vegetation cover at the other. There are no

scientific criteria for defining the limits at which the more productive types of *bīābān* merge into Western categories of semidesert and steppe. The most common terms for different types of barren *bīābān* are *lūt* (cf. *lokt* "bare"), which is generally the default term for barren surfaces; *kavīr* (according to Tomaschek, 1885, p. 582, < *gaver* < *gav*, cognate with *cavitas*, though Barthold, 1984, p. 134 preferred < Ar. *qafr*, pl. *qefār* "barren desert"; cf. Curzon, *Persian Question* II, pp. 246-47) for playas; and *rīg* or *rīgzar* for areas of shifting sand. *Kavīr* is generally equivalent to *solonchak* in the Russian literature on Central Asia. Various vernacular terms are also in use, sometimes associated with special conditions. For example, *daqq* is used for relatively small areas of *kavīr* in Khorasan, *kaffa* similarly in Kermān. In Central Asia the Turkic term *takyr* is used, and farther east the Mongolian term *nor* is found. West of the plateau the most common term is Arabic *sabka*.

Iranian *kavīrs* have attracted special interest (see especially the works of Bobek; Gabriel; Stratil-Sauer; and Krinsley, but the most accessible description and explanation is in Jackson et al., pp. 7-14; see also Cooke and Warren, pp. 215-28 for comparative discussion) and may be unique in the variety of their composition and surface types. They offer a prospect of desolate waste that extends almost continuously from within 50 km of Tehran to Afghanistan and the Persian Gulf. To H. B. Vaughan, the first European to provide a firsthand description, the *kavīr* looked like "a vast frozen sea stretching away . . . as far as the eye could reach in one vast glittering expanse" (1893, p. 105). As similar landscapes lie close to many of the major cities of Iranian history *kavīr* is often considered to be the characteristically Iranian desert type. It is composed of fine-grained sediments, saline to varying degrees, accumulated at the lowest part of a closed drainage basin in conditions where evaporation far exceeds precipitation and runoff. The texture varies according to the nature of the sediments, which may be silts or clays. The surface is often level, smooth, and hard, dry except after rain and ideal for all forms of transport. Similar surfaces are used for racing in the western United States and Australia. They may be treacherous, however; in some parts heavy traffic may break through the crust into deep, viscous mud. In other parts the crust may be divided into polygonal plates, which can grow and buckle as the salt crystallizes. Folding makes such areas impassable, comparable to and reminiscent of polar snowfields. In size *kavīrs* vary from a few score square meters to thousands of square kilometers.

The climate in such basins is extreme. In the driest, like the central deserts of the Iranian plateau, average annual precipitation (some of which may fall as snow in the north) is typically less than 100 mm and is restricted to the cooler months. Actual precipitation events are infrequent and may not occur for years at a time. Although records are inadequate and unreliable, annual mean temperatures appear to vary typically from 16° to

more than 20° C. Summer maximums in some parts exceed 50° C. and may be among the highest in the world.

The second most prevalent type of desert is sand (Pers. *rīg*, Darī and Tajik *rēg*, less commonly *šen*; often referred to in the scientific literature by the term “erg,” drawn from research in North Africa). Areas of dunes, partly shifting, partly vegetated and stable, partly regular (e.g., in crescent-shaped barchans), partly tangled and irregular, occur in various sizes on the leeward (southeastern) side of most basins (see Cooke and Warren, pp. 255-327, for comparative discussion). The deserts of Central Asia and the subcontinent are mostly sand-covered, but the largest impassable area lies on the Iranian plateau in southeastern Persia.

Other types of barren surface are typically called *lūt*. The best known are the undulating gray gravel plains characteristic of southeastern Persia, especially between Kermān and Bīrjand, and of southwestern Afghanistan (see the works of Gabriel, a physical geographer who traveled in the area in the 1920s and 1930s). But similar surfaces recur throughout the arid zone.

The typical *bīābān*, however, is not barren but supports some vegetation. Apart from the Caspian littoral, most of the arid zone may be considered *bīābān*, often including the mountainous areas (which are also largely barren except in sheltered valleys). The term *bīābān* may even be applied to the few upland areas with reliable average precipitation over about 350 mm per year, sufficient to support rainfed agriculture (except during the short growing season), as in parts of Azerbaijan, Kurdistan, Persian Khorasan, northeastern Baluchistan (Pakistan), and the central and eastern highlands of Afghanistan. Typical *bīābān* conditions, therefore, are broad plains with inland drainage, broken irregularly by minor ranges and rock outcrops. Average annual precipitation ranges between 100 and 400 mm, generally restricted to the cooler months, with highest probability in autumn and spring (although the monsoon often brings summer humidity in the south and occasionally even rain). There is great variation from year to year, and the low precipitation is complemented by low humidity and high insolation, with high rates of evaporation (especially during the summer) and diurnal temperature ranges not uncommonly exceeding 30° C. Strong winds blow constantly for weeks at a time throughout the warmer part of the year, especially in the north and east of the plateau; they are known as *bād-e sad o bīst rūz* (120-day wind) in Sīstān. Dust devils are ubiquitous, and dust storms are not uncommon. The wind deflates large quantities of material, producing here and there (beside sand) such fantastic topographical features as yardangs, known locally as *kalūt*, east of Kābīš. Vegetation cover varies from less than 5 percent to as much as 30 percent, even more in favored locations, and consists mostly of

low perennial shrubs, dominated by communities of *Salsola* and *Zygophyllum* (*qīč*) up to about 1,300 m and communities of *Artemisia* (*dermāna*), *Ephedra*, and *Amygdalus* at higher altitudes, with such psammophytes as saxaul (*Haloxylon* spp.) in sandy areas and halophytes like tamarisk (*Tamaryx* spp.; *gāz*) in drainage channels or saline depressions with high water tables. In the south wild [date palms](#) (*Phoenix dactylifera*) and dwarf palms (*Chamaerops* spp.) replace tamarisks. The barren, gravelly surface between perennial shrubs is filled for a few weeks in spring with a flush of annuals, which are particularly important in the regime of pastoralists, whether nomadic or based in villages.

Much of this typical *bīābān* is endowed with groundwater supplies that may be good and even plentiful, though varying in depth from as much as 100 m or more on the upper slopes of alluvial fans to very shallow levels close to the centers of plains. Soil conditions are often adequate to justify investment in irrigated agriculture.

Unfortunately the current state of research does not allow even a preliminary assessment of how much territory falls within each of these categories. The map in [Figure 18](#) is based on data from a number of sources. It is designed to provide a generalized representation of the sizes and locations of large desert areas relative to other major features. An exact map is not possible because the available sources are derived from incompatible attempts by individual investigators, each of whom has generalized from limited firsthand knowledge. The problem is especially noticeable with regard to the boundaries of *kavīr* and sand. The 2,000-m contour was chosen, and generalized, in order to bring out the saucer-like form of the Iranian plateau and the continuation of the arid zone eastward through Central Asia and Chinese Turkestan, as well as to show the approximate boundaries of mountainous areas (most of them arid and barren except in river valleys). At elevations below the contour line only large areas of sand and playa are marked. There are also many smaller areas of playa, sand, and hamada andserir surfaces, often gypsiferous, sometimes rolling or hilly. Determination of the exact limits and sizes of desert areas awaits definitive interpretation of satellite imagery.

Major desert areas.

For most parts of the arid zone data from field research are not yet sufficiently detailed to support more than brief general descriptions of particular deserts (see above; [Figure 18](#)). The following brief general description will serve as a guide to the literature, which lacks a modern synthesis.

*The Iranian plateau.* The central part of the Iranian plateau resembles a saucer. Alluvial fans sloping down from the ranges of the Alborz, Zagros, and Paropamisus ranges into

the arid interior represent the rim. They enclose a system of endorheic basins. A few of these basins in the northwest and southwest contain permanent lakes (e.g., Urmia, Neyrīz, and [Baktagān](#)). Sīstān, Jāz Mūrīān, Māškel, and Lora in the south and southeast, on the borders of Afghanistan and Pakistan, contain unreliable or intermittent lakes, depending upon river flow from the mountains to the east. Most of the remainder, the vast majority of the basins, contain playas of varying sizes (Persia, pp. 86-97). The largest basins, which lie in the geosyncline that forms the center of the saucer, constituting almost half of Persia, have the severest desert conditions. The barren wastes that occupy the greater part of them are commonly labeled Dašt-e Kavīr (also Kavīr-e Namak) and Dašt-e Lūt. These names are not in local use, however (cf. Gabriel, 1952, pp. 301-02 n. 49), do not appear in historical sources, and are probably derived from the mapping inquiries of foreign explorers in the 19th century. With few exceptions (always smaller areas) local communities tend to refer to all playas and other barren expanses as *kavīr*, *lūt*, or *bīābān*, without naming them. The most common local terms for the largest barren area are Great Kavīr (Kavīr-e bozorg) for the largest northern basin and simply *lūt* for its elongated continuation to the south.

The Great Kavīr is completely barren for more than 350 km from west to east and up to about 150 km from north to south. With the southern *lūt* and its continuation through minor watersheds to the south, past Narmāšīr into Jāz Mūrīān and through Sīstān into Kharan (Pakistan), it forms a continuous stretch of absolute barrenness from the alluvial fans of the Alborz mountains in the north to the edge of the plateau in Baluchistan, more than 1,200 km to the southeast. In altitude these central deserts slope from about 1,000 m in the north to about 250 m on the lowest *kavīr* just east of Šahdād (Kābīš) in the southwest. Average annual rainfall throughout these deserts is well under 100 mm. Near the center of the Lūt, which is in the driest part of the plateau, between the *kavīr* on the west and the erg on the east, the wind has carved out deep furrows, leaving broken ridges that increase in height and density toward the south. These fantastically eroded forms, called *kalūt* and yardangs by physical geographers, resemble passageways between ruined buildings and have sometimes been mistaken by foreign travelers for ruins of ancient cities (hence *šahr-e lūt* in the travel literature; see Gabriel, 1935, p. 185; Dresch).

The erg on the eastern side of the southern Lūt is the largest area of sand on the Iranian plateau, measuring approximately 160 km from north to south and as much as 65 km from east to west. Much of it is not only deep but also tangled without clear differentiation in waves and troughs or other types of dune formation, especially in the south. Within the central basins smaller *rīgs* are widely distributed, especially along the southern shore of the Great Kavīr (for a firsthand description, see Gabriel, 1935, pp. 225-34). Similar



conditions continue eastward into [Afghanistan i](#), broken by the uplands of Kūhestān (Qā'enāt) in southern Khorasan and farther south by the low ridge that checks the westward flow of the Helmand to form the large oasis of Sīstān. This eastern desert basin (in southwestern Afghanistan) is about 400 km from west to east and 250 km from north to south and is broken only by the courses of the Helmand itself and some seasonal rivers, of which the Kāšrūd (Afghanistan) and the Māškel (Persia and Pakistan) are the most significant. The largest continuous erg in Afghanistan is the Rīgestān (24,000 km<sup>2</sup>), southwest of Qandahār (Balsan). The Gowd-e Zereh (lake basin), which occasionally receives excess drainage from Sīstān, is separated from Kharan (in Pakistan) only by the low Chaghai hills, which, with the highlands around the extinct volcano Kūh-e Taftān, cause the Māškel river to form a lake (*hāmūn*) comparable to though much smaller than the lake of Sīstān. The desert north of the Helmand is known as Dašt-e Mārgō (11,500 km<sup>2</sup>).

East of the Iranian plateau the desert conditions continue: southeast into India and around the northern side of the Paropamisus, through a succession of large desert areas, broken by occasional rivers and skirted by the former Silk Route.

*The extension into India.* The Thar, or Great Indian Desert, in Sind (Pakistan) and Rajasthan (India), together with such adjoining areas as the Thal (between the Indus and Chenab rivers) and Cholestan, south and east of Bhawalpur, both in Punjab (Pakistan), stretches ca. 650 km from southwest to northeast and is up to 350 km wide, covering more than 200,000 km<sup>2</sup>. Colonization of the Thar has resulted exclusively from the westward extension of Indian influence, as political forces have sought to control the arterial routes across it, whereas the pastoral economy of the desert, though culturally mixed, has been more closely related to that of the predominantly Muslim populations to the west.

*The extension into [Central Asia i](#).* Northeast of the Iranian plateau is the Kara Kum (lit., "black sand," because dark with vegetation). The sands cover about 250,000 km<sup>2</sup>, sloping from east to west between the Oxus river ([Āmū Daryā](#)) and the Caspian, comprising about 60 percent of Turkmenistan. About 5 percent of the area consists of active barchans. Mean annual precipitation ranges between 70 and 150 mm. The vegetation is more plentiful and supports a richer array of fauna than in the deserts of the plateau (where, however, it may have been greater in the past); animals include antelope, wolves, and wildcats, as well as the flocks of Turkmen pastoralists. Beside the Oxus other, smaller rivers enter the desert from the south and supply irrigation systems before disappearing into the sand. The Oxus now feeds a canal that irrigates large areas along the southern edge of the Kara Kum and another in the direction of [Bukhara](#), which also



receives water from the Zarafšān. Recent archeological research shows evidence of earlier courses of the Oxus and other rivers that supported ancient settlement patterns; they demonstrate the basic instability of the local hydrology (Kohl). The Oxus appears to have flowed into the Caspian, at least for a brief period, as late as the 14th century.

On the other side of the Oxus lies the area known as Transoxania, or Mā warā' al-Nahr, where a series of important towns border the Kyzyl Kum (lit., "red sand"). This desert covers more than 300,000 km<sup>2</sup>, with mean annual precipitation of 100-200 mm, and extends up to the Jaxartes (Syr Daryā). It slopes gently from about 600 m in the southeast to about 50 m at the Aral Sea in the northwest. There is sufficient vegetation to support seminomadic herding not only of karakul sheep and [camels](#) but also of horses.

Both these deserts contain occasional playas (called *takyr*) among the dunes. Similar conditions continue eastward into Dzungaria and the Tarim Basin (China), where the Takla Makan, one of the world's largest accumulations of sand, with mean annual precipitation of only 10-40 mm, covers more than 270,000 km<sup>2</sup> (see [CHINESE TURKESTAN i](#)).

The Iranian experience of deserts.

The arid zone appears to have functioned as a conduit for both populations and cultural influences as early as the Paleolithic (Barthold, 1984, pp. 5, 87; Smith, p. 37; Kohl, pp. 35-44). The evolving synthesis of research on later prehistoric and protohistoric periods suggests that it continued in this function (Dyson; Voigt). The swift progress of Arab armies in the 7th century is a later example. Similarly, in subsequent centuries conversion to Islam was consolidated more quickly throughout this zone, from North Africa to Central Asia, than outside it. Since the 1st millennium B.C.E. Persian cultural influence has moved through this conduit in both directions. For example, religious influences spread early to the west, affecting both Greek and Roman paganism and the Judeo-Christian tradition (on the impact of Mithraism and Manicheism in the west, see, e.g., [COSMOGONY AND COSMOLOGY](#) ii-iii; [DUALISM](#); for Iranian elements in the Judeo-Christian tradition, see [BIBLE](#) iii; [DEAD SEA SCROLLS](#)). Later Persian literary and bureaucratic practices spread mainly to the east and predominated in Central and South Asia into the 20th century.

*Interdependence of bābān and ābādī.* The distribution of settlements further illustrates the importance of the arid zone as a conduit. Most towns with Iranian names, from Baghdad (Iraq) to Yārkand (China) lie within this zone. Others nestle to one side in fertile valleys surrounded by barren mountains. The oldest were founded on rivers that drain into the deserts. Some of these rivers (e.g., the Jaxartes, Zarafšān, and Zāyandarūd) have

supported major agricultural and urban development close to the mountains, whereas others (e.g., the Oxus, Morḡāb, and Helmand) have produced major oases in the desert. But most cities, a good example being Nīšāpūr, were founded on rivers that probably never provided a reliable perennial water supply. Instead, their seasonal rivers supported development through exploitation of groundwater by means of *qanāts*. Some later foundations on arid plains (e.g., Yazd and Kermān) depended entirely on the development of *qanāts* in arid plains. Whether or not they were founded on rivers, most Iranian cities look out over arid plains, which merge into sand and salt desert. Larger areas of desert generally provide the transition from predominantly Iranian to non-Iranian cultural areas, especially Russia in the north, Mongolia and the interior of China in the east, and India in the southeast.

Between these irreducible areas of barren playa and shifting sand, the legacy of earlier geological periods, most of the arid zone consists of *bīābān*, endowed with soil and groundwater resources that have permitted conversion into *ābādī* by means of investment in irrigation engineering and agricultural development. Until recently political stability has always encouraged this type of investment, which has pushed back the margins of the *bīābān*. New areas were continually being colonized; some settlements have been sustained, while others have reverted to *bīābān*. There is abundant textual, ecological, and archeological evidence (including visible ruins) of this type of fluctuation, reflected in these lines by Rūdakī (10th century): "Many a desert waste was once a pleasant garden / And pleasant gardens have appeared where once was desert" (Şafā, *Adabīyāt* I, p. 384). To a significant extent, therefore, the limits of the *bīābān* have always been determined not by natural factors alone but also by historical factors that have led at particular times to decisions to develop certain areas, rather than others. The distinction between desert and sown is as much the result of the socioeconomic dynamic and cultural choice as of natural endowment.

Whatever lay beyond the city and its agricultural hinterland at any particular time has been considered *bīābān*, land that the urban government did not control. (Land that contained no investment was not worth controlling.) But these vast areas of social exclusion were not empty. When the surrounding urban economies were disrupted or in recession the *bīābān* offered the only refuge and alternative source of livelihood. When the urban economies were expanding they reabsorbed population from the *bīābān* (Spooner, 1972). The ecological carrying capacity of the *bīābān* has always been limited by low natural productivity, but it could be enhanced to some extent by exploitation of the surrounding urban economies even in bad times. Its products have included xerophytic plants with medicinal and other properties, [charcoal](#) processed from woody shrubs, and

salt. Charcoal has always been in demand both as a preferred fuel in neighboring cities and for use in smelting locally mined ores (especially iron and [copper](#)). For many, life in the *bīābān* has depended on supplementing local food production by development of these markets, but the dominant livelihood in the *bīābān* has always been nomadic pastoralism.

Nomads have usually migrated in regular seasonal patterns, designed to satisfy their animals' need for water and palatable forage (however sparse) throughout the year. But, as they have the flexibility to adapt their movements to shifting circumstances, pastoralism has often constituted the economic base from which other possibilities have been opportunistically exploited. Where possible nomads have used the deserts seasonally, migrating to cool mountain pastures for the late spring and summer. The most successful pastoral operation in the central deserts is managed by the Sangsarī, who are transhumant pastoralists based on the village of Sangsar in the Alborz mountains north of Semnān. They migrate in the autumn and spring between their high mountain pastures and the northeastern margins of the Great Kavīr, on either side of the provincial boundary between Khorasan and Semnān, and produce meat for sale in Tehran. Through the Sangsarī the *bīābān* along the shore of the Great Kavīr, most of which has a vegetation cover of 15 percent or less (apart from the carpet of spring annuals that define a good year), makes a significant contribution to the national economy.

Just as city dwellers regard the *bīābān* as the frontier, so residents of the *bīābān* have always been ready to encroach on settled society. The settled population along the desert margins has lived in fear of raiders, who appear suddenly out of the desert and disappear back into it. The desert has also served the purposes of small armies. In the 19th century Baluch raided north through the central deserts, at one point threatening settlements close to Tehran (see [BALUCHISTAN i](#)). As late as the 1950s the main road to Mašhad from southern Khorasan was the scene of regular ambushes by Turkmen at the point where it crosses shifting sand north of Gonābād (for earlier evidence, see travelers' accounts, e.g., Truilhier). In the late 1950s [Bāṣerī](#) outlaws from the Kamsa confederation in Fārs who had moved north through the deserts routinely molested travelers between settlements along the northern shore of the Great Kavīr. For settled communities the *bīābān* has thus been synonymous not only with anarchy and insecurity but also with tribalism (see [‘AŠĀYER; CONFEDERATIONS; TRIBES](#)).

The desert zone has served as a deterrent to invaders from outside. In the 19th century the British regarded it as the ultimate buffer between India and Russia, a view that led, directly or indirectly, to much of the exploration and travel from which current information about deserts in that zone is derived.

*Travel and trade in the desert.* Apart from the need to protect the *ābādī* from eruptions of raiders out of the *bīābān*, cities have had to ensure the security of arterial routes through it. The prosperity of each city has depended as much upon trade as upon local production. The overwhelming proportion of all long-distance travel has involved crossing or skirting major deserts, within and between the plateau and Transoxania, between Transoxania and China, and between the plateau and India and the Mediterranean. Long-distance travel was always daunting if not dangerous. The city dweller was not prepared to deal with dust storms, salt bogs, extreme temperatures, and lack of water, fodder, and provisions, much less brigands and robbers. Although the deserts are crisscrossed by arterial and lesser routes (Spooner 1969; idem, 1972), where possible traffic skirts the severer regions, zigzagging along the margins from one city and its agricultural hinterland to the next; most travelers have preferred the difficulties of mountain routes to the dangers of the deserts. On major routes oases formerly provided important staging posts for trade between cities. The prosperity of those oases rose and fell with the economies of the cities. On the plateau the most celebrated oases, each described by travelers from the 10th century to very recently, were Garma (Jarmaq), Nāyband (Nāband), and NosĀratābād Sepī (Sanīj), each benefiting from the opportunity to provide a resting place for caravans crossing the central deserts between west and east (or southwest and northeast). There were also minor routes, especially across the Lūt from Šahdād to Deh-e Salm and Neh, and many lesser oases along the margins, which provided similar but inferior services, with less security. Nāṣer-e Kōsrow, who passed through Garma to Ṭabas in 444/1052, mentioned (p. 129) water tanks beside small domes at every 2 farsangs; the domes served to mark the route; they must have been intended to service travelers. The 10th-century traveler Maqdesī (Moqaddasī, p. 491) also mentioned the route north from Jarmaq across the Great Kavīr to [Dāmḡān](#). These early sources lack detailed information about natural and social conditions. Eṣṭaḡrī (pp. 227-37; cf. Ebn Ḥawqal, pp. 287-88) provided more detail about the oases themselves (for a summary of some medieval reports, see Le Strange, *Lands*, pp. 322-33). The actual routes were rarely engineered or equipped with bridges, but in the 16th century [Shah ‘Abbās I](#) (996-1037/1588-1629) had a stone causeway (*sangfarš*) 3 m wide and nearly 30 km long built across a narrow *kavīr* south of Garmsār (K<sup>v</sup>ār), in order to shorten the route from Isfahan to Mašhad. It is unclear when it fell into disrepair, but it still survives (Gabriel, 1952, p. 85).

Some oases have provided niches in a settled economy for individuals and communities that have chosen to avoid cities, especially those, like the Zoroastrians outside Yazd and the Isma‘ilis and Bahais in isolated parts of the Qā’enāt and Baluchistan, that are out of favor with orthodox religious authorities.

*Perceptions of the desert.* Areas of *bīābān* that were not colonized or close to major oases remained the domain of nomadic pastoralists. From the dichotomy of interests between nomads and villagers in and around the *bīābān* arose the characteristic social distinction between the life of settled agriculture (*ābādī*) and the nomadic life of the *bīābān*; the governing factor was the ability of the cities to colonize the *bīābān* by investing in development of *qanāts*. The cultural elaboration of this distinction is deeply rooted in Persian traditions and differs in interesting ways from comparable traditions. For example, in Persian literature there is no role for the nomad equivalent to the role of the Bedouin in Arabic literature.

Although the *bīābān* had to be crossed, it was never a place to tarry. But it not only represented the antithesis of civilized life; its importance in the historical record has also been distorted by the urban monopoly of literacy. Moreover, urban prejudices against the *bīābān* and the tribal and nomadic forms of life that characterized it, though at first mildly contested by Western interest in the primitive life of the wilderness, have more recently been reinforced by Western stereotypes of the ecological impact of traditional pastoralism. Nonetheless, many of the intangibles of Iranian urban life and culture are derived from the surrounding *bīābān*. City dwellers benefit from low humidity and abundant sunlight, enjoying not only the clear horizons of the *bīābān* but also its unique range of light and color. It also ensures pleasantly cool summer nights and warm winter sunshine. The *bīābān* is the backdrop for the "good life," from picnic sites beside springs or streams on the threshold of the desert within easy reach of the *ābādī*; they are popular sites for open-air activity on the last day of the Nowrūz holiday (*sīzdah-bedar*). The Sasanians displayed a similar orientation when they constructed large enclosures (OPers. *para-dayadām*, Av. *pairi-daēza* - > Gk. *paradeisos* > Eng. "paradise"; NPers. *pālīz*, Pers. and Ar. *ferdows*) to minimize the dangers and enhance the pleasures of the *bīābān*. This taste for experiencing the *bīābān*, but with the comforts and security of the *ābādī*, epitomizes the Iranian perception of the natural environment, which has persisted to the present day.

*Environmental change and conservation.* Another significant dimension of the relationship between *bīābān* and *ābādī* can be observed in the effects of human exploitation of the natural resources of the *bīābān*. The sparse vegetation has been systematically grazed to varying degrees, depending upon accessibility. It has also provided construction materials for winter shelters (*āgōl*) for shepherds and their animals; been consumed as fuel for heating, cooking, and processing pastoralists' milk products; and plundered over wide areas for charcoal production. Whether or not the extent of barren desert and of sand movement and the incidence of dust storms have increased as a result of persistence of these traditional technologies as the population has risen in the modern period remains an



open question. Equally unclear is whether the *bīābān* has undergone desertification recently or steadily since the original spread of nomadic pastoralism and later *qanāt*-based settlement. Nor has it been determined whether urban environments have suffered as a consequence of desertification.

Historical references, as well as modern experience and experimentation, suggest that natural vegetation cover, which is removed when land is prepared for crop production, is also reduced by any increase in human activity. It has been shown as well that vegetation cover can, with careful management, be restored. Reconstruction of the history of vegetation cover in particular areas of *bīābān* has been attempted by means of palynological (Moore and Stevenson) and even dendrochronological (Bhadresa and Moore) studies, but the results so far are inconclusive. In the first half of the 19th century travelers from India (e.g., Forster, p. 190) reported difficulty in finding firewood in places where it is available today, which suggests that conditions may have improved. But travelers' reports are inconsistent, and, as no quantitative data are offered, it is possible that expectations simply varied (for discussion, see Edāra).

In the 1950s increasing awareness of diminishing wildlife populations, especially game species, and increasing severity of sand and dust storms led to a series of government initiatives. In Persia two agencies developed long-term programs for reversing desertification by improving the productivity of the 125 million ha classified as rangeland (the area likely to be used by pastoralists out of the 165 million ha that constitute the total territory of Persia; see [ECOLOGY](#) AND [ENVIRONMENTAL PROTECTION](#)). The Forest and range organization (Sāzmān-e jangalhā wa marāte'-e kešvar) focused on stabilizing sand dunes and enhancing forage in the more heavily grazed areas. The Department of the environment (Sāzmān-e ḥefāẓat-e moḥīṭ-e zīst) concentrated on the conservation of vegetation and wildlife in areas that were of less economic importance. The department of geography at Tehran University also developed a special program of research on the central deserts; the university established a desert-research center in the late 1970s. In the mid-1970s a "national spatial strategy plan," which involved the first systematic study of the whole of Persia, including the desert areas, was formulated in the Sāzmān-e barnāma (Plan organization).

The long drought of the late 1960s and early 1970s made desertification an issue in all the countries of the arid zone. China, India, Persia, Pakistan, and the Soviet Union all contributed case studies to the United Nations Conference on Desertification in Nairobi in 1977. Afghanistan submitted a country report. Persia led an effort to involve Afghanistan, India, and Pakistan in designing a project to deal with "transnational" problems of desertification in the region. In recent years the Research institute of forests and

rangelands (Mo'assa-ye taḥqīqāt-e jangalhā wa marāte') in the Persian Ministry of agriculture (Kowsar), the Central Arid Zone Research Institute in Jodhpur (India), the Arid Zone Research Institute in Quetta, the Agricultural Research Council and the Irrigation Research Council (Pakistan), and the desert-research institutes in Repetek (Turkmenistan) and Lan-chou (China) continue to be involved in these international efforts.

As a result of these activities specific conservation technologies have advanced considerably, but there has been little improvement in overall land-use policies or in ability to prevent further desertification. Areas close to arterial routes and concentrations of population attract investment relatively easily but also tend more readily to become "desertified" from overexploitation. Desertification occurs around all settlements as a consequence of the activities described above, an ecological price not infrequently paid for increased production. The *bīābān* today often bears the scars of past (discontinued) investment. Although it was initially assumed by international experts that for optimum resource management it was necessary simply to reduce the level of human exploitation and to modernize traditional practices, some research findings indicate that the problem is more complex. Attempts to redevelop may require greater investment than was originally necessary. For example, where investment has been discontinued in recent times, whether because of insecurity or other economic disruption, agricultural land has reverted not only to *bīābān* as expected but also to severer desert conditions than before, as a result of the loss of seed reserves and of soil erosion. In one documented instance in Kar (a small [\*dehestān\*](#), in southeastern Semnān province), reduction in agricultural investment has led to encroachment of sand, unknown earlier. It appears, therefore, that much of the present *bīābān* is not simply pristine wilderness but rather a product of long coadaptation of human populations, domesticated species, and natural processes over centuries, even millennia. The effects of traditional technologies, unchanged over long periods, have been cumulative, with the result that radical removal of the human factor now, even where it has become excessive, may not be the best road to conservation.

The balance of the historical relationship between *ābādī* and *bīābān* has undergone significant shifts in recent decades. Motorization of long-distance traffic in the 1960s for the first time made it more practical to travel around the deserts than through them. The oases on the routes through the deserts consequently sank into isolation and decline. Ignored by the government, the deserts soon became the domain of smugglers. But, with the beginning of national spatial planning in the mid-1970s, the deserts began to be reincorporated into the larger society. For the first time the Persian government sees the *bīābān* not simply as the area between cities and the antithesis of urban life but also as so many square kilometers of national territory with economic, political, and strategic assets.



It is not possible to predict how these changes will in the long term affect the significance of the *bābān* in Persian culture.

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(BRIAN SPOONER)

[Figure 18](#). Location of major desert areas in relation to other features. Sources: Anders; Dresch; works by Gabriel; Hedin; Kohl; Persia; the author's field notes.

(Brian Spooner)

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